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Pattern Driven Stress Localization ANDREW CROLL, ALFRED CROSBY, University of Massachusetts — The self-assembly of patterns from isotropic initial states is a major driver of modern soft-matter research. This avenue of study is directed by the desire to understand the complex physics of the varied structures found in Nature, and by technological interest in functional materials that may be derived through biomimicry. In this work we show how a simple striped phase can respond with significant complexity to an appropriately chosen perturbation. In particular, we show how a buckled elastic plate transitions into a state of stress localization using a simple, self-assembled variation in surface topography. The collection of topographic boundaries act in concert to change the state from isotropic sinusoidal wrinkles, to sharp folds or creases separated by relatively flat regions. By varying the size of the imposed topographic pattern or the wavelength of the wrinkles, we construct a state diagram of the system. The localized state has implications for both biological systems, and for the control of non-linear pattern formation.

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